

RECENT BOTANICAL STUDIES IN ANDAMAN AND NICOBAR ISLANDS

N. P. BALAKRISHNAN

Botanical Survey of India, Port Blair

The establishment of a new Circle of Botanical Survey of India at Port Blair in 1972 exclusively for the survey and studies on the flora of these islands, heralds a new era in the botanical history of these islands. A majority of these islands remain botanically unexplored or under-explored consequent on sporadic efforts by visiting parties from the mainland in the very early days, and the several visits of officers of the BSI at various intervals more recently. This new unit of Botanical Survey of India has today attained the status of a fully functional research establishment for conducting studies on the flora and phytogeography of these islands. In spite of some handicaps experienced due to the remote localities with meagre communication facilities and funds, this unit has been able to survey several underexplored and unexplored forest areas during the last 6 years. As a result, the up-to-date collection amounts to about 8000 field numbers totalling about 50,000 herbarium specimens. The Herbarium, now housed in a small residential building is shifting to suitably designed new building. This would be the first fullfledged permanent research establishment in these islands and the only research centre in India for studies on insular floras.

At present field work is concentrated in North Andamans and Great Nicobar, both botanically poorly known. The first ever botanical survey of the Saddle Peak in North Andamans, the highest peak in Andaman and Nicobar Islands, was initiated by this unit in November, 1976 and followed up in March, 1977. This has yielded several very interesting new species and new records of plants. The survey of Great Nicobar has also yielded several novelties. Apart from these, survey work is also being undertaken in Little Andaman, Car Nicobar, Katchal and Middle Andamans. A flora of Car Nicobar Island is under preparation and is expected to be published shortly.

Soon after the establishment of this Circle in 1972, the first task undertaken was to prepare a list of all species of vascular plants reported in the past as occurring in these islands, which came to only about 1620 species of vascular plants. Today due to our survey during the last 6 years it has been possible to add another 650 species to this list. A major part of these additional species are new records to these islands of species known to occur in Burma, Thailand, Malaysia and Indonesia. As a result of detailed studies 1 new genus,

21 new species and varieties have been discovered.

The flora of Andaman and Nicobar Islands is unique in India showing affinities to Assam and Burma in the north, Thailand and Malaysia in the east and Sumatra and Java towards the south. A very interesting feature of this flora is that, of the 2270 species of vascular plants known from these islands till today only a meagre 25% show widespread distribution in all the neighbouring areas including mainland India, Burma, Thailand, Malaysia and Indonesia. About 20% show distribution only towards the north in Burma and N.E. India. The most interesting part is the 45% of plants which show distribution only towards Malaysia and Indonesia. The rest 10% of the plants are endemics confined to these islands. We have found that there are about 225 species of plants or about 10% of the flora, which are endemic to these islands, a percentage is quite high for areas of comparable size anywhere else in India. An endemic flora of 225 species, within the confines of a land area of about 8300 sq. km as small as a district in mainland India, is a significant phytogeographical feature.

The Andaman and Nicobar Islands are undoubtedly 'Continental,' connected in the geological part (possibly during the mid-tertiary), with the main continental land mass of Burma, Thailand, Malaysia and Indonesia, and hence, contain a biosystem called 'sub-continental biosystem'. The flora and also the fauna of these islands have evolved to their present state from a complete balanced continental flora and fauna and also got improved by gradual extinction of many species, counter-balanced by the establishment of occasional new species and new introductions. The occurrence of plants showing certain types of seed dispersal in plants of any island is a strong indication that the

island must have formerly been attached to a mainland, or these plants could never be found there. For, example, our recent studies indicate the presence of many genera of plants which have close relatives in Burma, Thailand, Malaysia and Indonesia and the seeds of these genera could not have reached these islands by any possible means of dispersal, i.e. wind, birds or sea. Some of these genera are *Argostemma*, *Burmannia*, *Coptophyllum*, *Cyrtandra*, *Cyrtandromoea*, *Mesua*, *Osbeckia*, *Phrynium*, *Ryparosa*, several Zingiberaceae, etc.

It is also possible that the Andaman group and Nicobar group of islands were two ranges of mountain system representing peaks of partially submerged ranges stretching from Arrakkan-Yoma in Burma to Sumatra with the intervening 10°N channel separating the two. It is also possible that the separation of Andaman group from Nicobar group occurred earlier than their respective separation from Burma and Sumatra. This is evidenced by the striking dissimilarities between the floras of Andamans and Nicobars and also by the former showing great affinities to N.E. India and Burma and the latter to Sumatra and Malaysia. To cite a few striking examples, the various species of *Dipterocarpus* (Gurjan), *Pterocarpus* (Padauk), *Osbeckia*, *Clematis*, *Talamua*, *Habenaria*, *Coelogyne*, *Porpax*, *Pubistylis*, *Cnesmone*, *Vanilla*, etc. are found only in Andaman islands and do not extend to Nicobar group of islands. On the contrary the various species of *Cyathea* (Tree fern), *Astronia*, *Coptophyllum*, *Otanthera*, *Cyrtandra*, *Rhynchoglossum*, *Rhopaloblaste*, *Stemonurus*, etc. occur only in Nicobar Islands and do not extend to Andaman Islands. The animals inhabiting these islands may also give corroborative evidence.

The vegetation of these islands repre-

sent a closed community, where every individual species has limited resources in respect of space, light, water and nutrients. Even though imperceptibly each of these strive to get more and more light, space, water and nutrients, the scope of any one species becoming dominant or widespread is limited unless land clearance takes place due to man's interference. One striking example is *Cyrtandromoea nicobarica* an endemic shrub of Great Nicobar Island, with beautiful white flowers which was extremely rare so far. Until 1975 this species was known from the single collection made in 1875 by the German Botanist, Sulpiz Kurz, the plant remaining uncollected for a century. Recently due to road-building activities in Great Nicobar, large areas of virgin forests have been cleared and obviously due to the new scope this species has spread becoming very common and dominant along roadsides and near human habitations. This shows that many of the species are potentially versatile and capable of widespread distribution but are suppressed due to stiff competition from other associated species and once these limiting factors are removed, some of these species can come into dominance in disturbed areas.

Another unique feature of the flora of these islands is the distribution of endemics. Of the 225 endemic species known from these islands, we have been able to collect only 135 species during the last few years indicating that possibly most of the others have become either extinct or rare due to human interference in clearing forests for developmental and rehabilitation work. A list of these endangered endemic species is appended at the end of this paper. It is also interesting to note that most of the endemics are confined to only one or few of the 319 islands of this archipelago. Therefore,

any destruction or deforestation even in a small island would result in the irreparable loss of one or more of these rare endemic species becoming extinct and never again available for future generations. The recent increase in human activities in these islands may in due course grievously affect the rare unique flora of these islands. Unless steps are taken to restrict human interference with the forests and maintain the delicate eco-system of these islands, most of these endemic endangered species will be lost, not only for our country but also for entire mankind. Every pocket of virgin forest and every small island so far remaining undisturbed in these islands is precious for our country as it may contain one or more endemic species. As such, pockets of these forests must be protected for the benefit of future generations.

In this context and considering the priorities the Botanical Survey of India intends to follow; for the future, the following programme.

1. *Survey of Islands which remain unexplored and underexplored*: Of the 319 islands only in about 80 islands some botanical work has been done so far. The remaining about 239 islands still remain botanically, hardly known. In order to get a complete picture of the flora of the entire area, these islands also need to be studied in detail. This can be expedited by increase in staff and provision of assured communication facilities by way of a research ship at the disposal of the survey parties.

2. *Establishment of a Botanic Garden at Port Blair*: Here it is proposed to gather together all endangered and endemic species from different islands under cultivation for propagation and studies on them for the benefit of future generations. This

has become an immediate necessity to ensure germ plasm stock of the endangered and endemic species facing extinction in these islands due to human interference. Another programme of work to be undertaken by this Botanical Garden is introduction and experimental cultivation of many economically or medicinally useful plants from S.E. Asian countries. Since the climatic and soil conditions of Andamans are similar to Malaysian and Indonesian countries this is an ideal place for the first introduction of many plants from these countries which can be experimentally cultivated and studied before releasing for cultivation in these islands and later in mainland India.

3. *Biological studies on mangrove forests* : The importance of mangrove forests in the maintenance of adequate fish population around these islands cannot but be duly stressed. The mangrove forests harbour innumerable organisms starting from microbes to large fishes. There is an interesting chain of flow of nutrients from mangrove plants to the large fishes around these islands through several intermediate stages of bacteria, fungi, crustacea, amphipods, copepods and small fishes. The fallen leaves and other materials from mangrove trees and other plants form the food of small microbes and fungi which in turn form the food of small fishes, crustacea and amphipods and the large fishes in turn feed on these small animals. So the mangroves form a basic necessity for keeping and replenishing the fish fauna around these islands. This stage by stage flow of nutrients from mangroves to large fishes, needs to be studied in detail to know how important the mangroves are for the development of fisheries in these islands. Such research work on the importance of mangroves in fisheries have been done in the U.S.A. and as a result, the U.S. Government has conserved the entire man-

grove area of Southern Florida preventing any human interference to protect a multi-million dollar fish industry, of the area. Similar research work should be done in India, particularly in Andamans where there are large areas of mangrove forests. The recent establishment of a unit of the Zoological Survey of India in Port Blair facilitates such collaborative research.

4. *Conservation of wild flora* : Detailed studies on the flora of different islands in future would reveal areas which need to be conserved as 'Biospheres' preventing any sort of human interference so that such areas can be preserved and protected for posterity and for the benefit of future generations. We must build houses and provide farmlands for our people, build new factories, roads and increase our supplies of timber. But in addition, we must see that we do not hand down to our successors a defaced and ugly land. Biological information can only be slowly acquired and there is always a danger that by the time it becomes available the immediate advantages of an industrial or rehabilitation scheme have won the day and another stretch of virgin forests has been lost to posterity. To avoid this, selected areas rich in flora and fauna with rare and endangered species should be immediately conserved as 'Biospheres' preventing any sort of human interference.

LIST OF RARE AND ENDANGERED ENDEMIC PLANTS OF ANDAMAN AND NICOBAR ISLANDS

- | | |
|--|-----------------|
| 1. <i>Aerides emericii</i>
Reichb. f. | — Orchidaceae |
| 2. <i>Aglaonema nicobarica</i>
Hook. f. | — Araceae |
| 3. <i>Alpinia manii</i> Baker | — Zingiberaceae |
| 4. <i>Amoora manii</i>
Brandis | — Meliaceae |
| 5. <i>Amorphophalus carnosus</i>
Engler | — Araceae |

- | | | | |
|--|------------------|---|-----------------|
| 6. <i>Amorphophalus longisetus</i> Kurz | — Araceae | 28. <i>Cryptocarya andamanica</i> Hook. f. | — Lauraceae |
| 7. <i>Amorphophalus oncomphyllus</i> Hook. f. | — Araceae | 29. <i>Cryptocarya ferrarsii</i> Hook. f. | — Lauraceae |
| 8. <i>Anacolosia puberula</i> Kurz | — Olacaceae | 30. <i>Cyrtandra burtii</i> Balakr. | — Gesneriaceae |
| 9. <i>Aphananthe lucida</i> (Kurz) Leroy | — Rutaceae | 31. <i>Cyrtandra occidentalis</i> Balakr. & Burt | — Gesneriaceae |
| 10. <i>Artabotrys nicobarianus</i> D. Das | — Annonaceae | 32. <i>Dendrobium tenuicaule</i> Hook. f. | — Orchidaceae |
| 11. <i>Aspidopterys andamanica</i> Hutch. | — Malpighiaceae | 33. <i>Daemonorops manii</i> Becc. | — Aracaceae |
| 12. <i>Bentickia nicobarica</i> (Kurz) Becc. | — Arecaceae | 34. <i>Dioscorea rogersii</i> Prain & Burk. | — Dioscoreaceae |
| 13. <i>Boesenbergia albolutea</i> (Baker) Schlecht. | — Zingiberaceae | 35. <i>Dioscorea vexans</i> Prain & Burk. | — Dioscoreaceae |
| 14. <i>Bombax insigne</i> Wall. var. <i>polystemon</i> Prain | — Bombacaceae | 36. <i>Diospyros andamanica</i> (Kurz) Bakh. f. | — Ebenaceae |
| 15. <i>Buchanania platyneura</i> Kurz | — Anacardiaceae | 37. <i>Diospyros marmorata</i> R. N. Parker | — Ebenaceae |
| 16. <i>Bulbophyllum protractum</i> Hook. f. | — Orchidaceae | 38. <i>Diplospora andamanica</i> Balakr. & N. G. Nair | — Rubiaceae |
| 17. <i>Calamus dilaceratus</i> Becc. | — Aracaceae | 39. <i>Drypetes andamanica</i> (Kurz) Pax & Hoffm. | — Euphorbiaceae |
| 18. <i>Calamus nicobaricus</i> Becc. | — Aracaceae | 40. <i>Drypetes colocarpa</i> (Hook. f.) Pax & Hoffm. | — Euphorbiaceae |
| 19. <i>Canarium manii</i> King | — Burseraceae | 41. <i>Drypetes leiocarpa</i> (Kurz) Pax & Hoffm. | — Euphorbiaceae |
| 20. <i>Canthium gracilipes</i> Kurz | — Rubiaceae | 42. <i>Dysoxylum racemosum</i> King | — Meliaceae |
| 21. <i>Casearia andamanica</i> King | — Flacourtiaceae | 43. <i>Embelia microcalyx</i> Kurz | — Myrsinaceae |
| 22. <i>Cleistocalyx nicobaricus</i> (King) Merr. & Perry | — Myrtaceae | 44. <i>Eria andamanica</i> Hook. f. | — Orchidaceae |
| 23. <i>Clematis smilacifolia</i> Wall. ssp. <i>andamanica</i> Kapoor | — Ranunculaceae | 45. <i>Eulophia nicobarica</i> Balakr. & N. G. Nair | — Orchidaceae |
| 24. <i>Cnesmone javanica</i> Bl. var. <i>glabriuscula</i> Balakr. & N. G. Nair | — Euphorbiaceae | 46. <i>Euphorbia epiphylloloides</i> Kurz | — Euphorbiaceae |
| 25. <i>Connarus nicobaricus</i> King | — Connaraceae | 47. <i>Excoecaria rectinervis</i> Kurz | — Euphorbiaceae |
| 26. <i>Corypha macropoda</i> Kurz | — Arecaceae | 48. <i>Ficus andamanica</i> Corner | — Moraceae |
| 27. <i>Crinum pusillum</i> Herb. | — Amaryllidaceae | 49. <i>Garcinia andamanica</i> King | — Clusiaceae |

- | | | | |
|---|-----------------|--|-------------------|
| 50. <i>Garcinia cadelliana</i>
King | — Clusiaceae | 73. <i>Jasminum multiflorum</i>
var. <i>nicobaricum</i>
Thoth. | — Oleaceae |
| 51. <i>Garcinia calycina</i>
Kurz | — Clusiaceae | 74. <i>Jasminum unifolio-</i>
<i>latum</i> Balakr. &
N. G. Nair | — Oleaceae |
| 52. <i>Garcinia jelineckii</i>
Kurz | — Clusiaceae | 75. <i>Kaempferia siphon-</i>
<i>antha</i> Baker | — Zingiberaceae |
| 53. <i>Garcinia kingii</i>
Pierre & Vesque | — Clusiaceae | 76. <i>Linostoma anda-</i>
<i>manica</i> Parkins. | — Thymeleaceae |
| 54. <i>Garcinia kurzii</i>
Pierre | — Clusiaceae | 77. <i>Macaranga nico-</i>
<i>barica</i> Balakr. &
Chakrab. | — Euphorbiaceae |
| 55. <i>Gouania anda-</i>
<i>manica</i> King | — Rhamnaceae | 78. <i>Madhuca caloneura</i>
(Kürz) H. J. Lam. | — Sapotaceae |
| 56. <i>Ginallia anda-</i>
<i>manica</i> Kurz | — Loranthaceae | 79. <i>Maesa andamanica</i>
Kurz | — Myrsinaceae |
| 57. <i>Globba pauciflora</i>
Baker | — Zingiberaceae | 80. <i>Mangifera andamanica</i>
King | — Anacardiaceae |
| 58. <i>Glochidion anda-</i>
<i>manicum</i> Kurz | — Euphorbiaceae | 81. <i>Mapania andamanica</i>
Clarke | — Cyperaceae |
| 59. <i>Glycosmis pilosa</i>
Narayanasw. | — Rutaceae | 82. <i>Memecylon anda-</i>
<i>manicum</i> King | — Melastomataceae |
| 60. <i>Gomphandra comosa</i>
King | — Icacinaceae | 83. <i>Memecylon collinum</i>
Balakr. & N. G. Nair | — Melastomataceae |
| 61. <i>Goniothalamus mac-</i>
<i>ranthus</i> (Kurz) Boerl. | — Annonaceae | 84. <i>Memecylon kurzii</i>
King | — Melastomataceae |
| 62. <i>Habenaria anda-</i>
<i>manica</i> Hook. f. | — Orchidaceae | 85. <i>Memecylon subtriner-</i>
<i>vium</i> Miq. var.
<i>grandifolium</i> Kurz | — Melastomataceae |
| 63. <i>Hippocratea anda-</i>
<i>manica</i> King | — Celastraceae | 86. <i>Mesua manii</i> (King)
Kosterm. | — Clusiaceae |
| 64. <i>Hippocratea nico-</i>
<i>barica</i> Kurz | — Celastraceae | 87. <i>Mimosops anda-</i>
<i>manensis</i> King &
Gamble | — Sapotaceae |
| 65. <i>Hypoestis anda-</i>
<i>manica</i> Thoth. | — Acanthaceae | 88. <i>Miliusa tectona</i>
Hutch. & Parkins. | — Annonaceae |
| 66. <i>Hypoxis orchioides</i>
Kurz | — Hypoxidaceae | 89. <i>Mitrephora anda-</i>
<i>manica</i> Thoth. &
D. Das | — Annonaceae |
| 67. <i>Ixora andamanica</i>
Bremek. | — Rubiaceae | 90. <i>Nauclea gageana</i>
King | — Rubiaceae |
| 68. <i>Ixora capituliflora</i>
Bremek. | — Rubiaceae | 91. <i>Olarx imbricata</i> Roxb.
var. <i>membranifolia</i>
Kurz | — Olacaceae |
| 69. <i>Ixora hymeno-</i>
<i>phylla</i> Bremek. | — Rubiaceae | 92. <i>Ophiorrhiza infundi-</i>
<i>bularis</i> Balakr. | — Rubiaceae |
| 70. <i>Ixora longibracteata</i>
Bremek. | — Rubiaceae | 93. <i>Ophiorrhiza nico-</i>
<i>barica</i> Balakr. | — Rubiaceae |
| 71. <i>Ixora nicobarica</i>
Bremek. | — Rubiaceae | | |
| 72. <i>Ixora tenuifolia</i>
Bremek. | — Rubiaceae | | |

- | | | | |
|--|-------------------|--|------------------|
| 94. <i>Orophaea katchallica</i>
Kurz | — Annonaceae | 116. <i>Pteroceras berkeleyi</i>
(Reichb. f.) Holtt. | — Orchidaceae |
| 95. <i>Orophaea salicifolia</i>
Hutch. | — Annonaceae | 117. <i>Pubistylis andamanensis</i> Thoth. | — Rubiaceae |
| 96. <i>Orophaea torulosa</i>
Hutch. | — Annonaceae | 118. <i>Rhopaloblaste augusta</i>
(Kurz) H. E. Moore | — Arccaceae |
| 97. <i>Otanthera nicobariensis</i> Tejasm. & Binn. | — Melastomataceae | 119. <i>Sarcostigma edule</i>
Kurz | — Icacinaceae |
| 98. <i>Pelliona procradifolia</i>
Kurz | — Urticaceae | 120. <i>Scutellaria andamanica</i> Prain | — Lamiaceae |
| 99. <i>Phalaenopsis speciosa</i> Reichb. f. | — Orchidaceae | 121. <i>Sphyranthra lutescens</i> (Kurz) Pax & Hoffm. | — Euphorbiaceae |
| 100. <i>Phanera nicobarica</i>
Balakr. & Thoth. | — Caesalpiniaceae | 122. <i>Stephania andamanica</i> Diels | — Menispermaceae |
| 101. <i>Phrynium cadellianum</i> King & Hook. f. | — Marantaceae | 123. <i>Strobilanthes andamanensis</i> Bor | — Acanthaceae |
| 102. <i>Phrynium paniculatum</i> Balakr. | — Marantaceae | 124. <i>Strobilanthes microcarpus</i> T. And. | — Acanthaceae |
| 103. <i>Pinanga andamanensis</i> Becc. | — Arecaceae | 125. <i>Strobilanthes paucinervius</i> Clarke | — Acanthaceae |
| 104. <i>Pinanga manii</i> Becc. | — Arecaceae | 126. <i>Strychnos narcondensis</i> A. W. Hill | — Loganiaceae |
| 105. <i>Pithecellobium nicobaricum</i> King | — Mimosaceae | 127. <i>Tedehagi triquetrum</i> ssp. <i>andamanicum</i> Balakr. & N. G. Nair | — Fabaceae |
| 106. <i>Phyllanthus andamanica</i> Balakr. & N. G. Nair | — Euphorbiaceae | 128. <i>Taeniophyllum andamanicum</i> Balakr. & Bhargava | — Orchidaceae |
| 107. <i>Poaephyllum nicobaricum</i> Balakr. | — Orchidaceae | 129. <i>Tinospora andamanica</i> Diels | — Menispermaceae |
| 108. <i>Pomatocalpa andamanicum</i> (Hook. f.) J. J. Sm. | — Orchidaceae | 130. <i>Uvaria nicobarica</i> Raiz. & Sahni | — Annonaceae |
| 109. <i>Popowia parvifolia</i> Kurz | — Annonaceae | 131. <i>Vanilla andamanica</i> Rolfe | — Orchidaceae |
| 110. <i>Prismatomeris andamanica</i> Ridl. | — Rubiaceae | 132. <i>Vernonia andamanica</i> Balakr. & N. G. Nair | — Asteraceae |
| 111. <i>Pseuduvaria prainii</i> (King) Merr. | — Annonaceae | 133. <i>Vitex wimberleyi</i> Kurz | — Verbenaceae |
| 112. <i>Psychotria andamanica</i> Kurz | — Rubiaceae | 134. <i>Walsura candollei</i> King | — Meliaceae |
| 113. <i>Psychotria nicobarica</i> Kurz | — Rubiaceae | 135. <i>Wendlandia andamanica</i> Cowan | — Rubiaceae |
| 114. <i>Psychotria pendula</i> Hook. f. | — Rubiaceae | 136. <i>Xanthophyllum andamanicum</i> King | — Polygalaceae |
| 115. <i>Psychotria tylophora</i> Kurz | — Rubiaceae | | |